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Characterization of integrons and associated gene cassettes in *Acinetobacter baumannii* strains isolated from intensive care unit in Tehran, Iran

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ABSTRACT

Objective: To determine the antimicrobial susceptibility patterns, the frequency of integrons and associated gene cassettes in *Acinetobacter baumannii* (*A. baumannii*) strains isolated from selected hospital intensive care units.

Methods: During a ten-month period, 120 *A. baumannii* isolates were studied. The resistance rates to different classes of antimicrobial agents were determined. PCR was used to detect different types of integrons and associated gene cassettes.

Results: The resistance rates to the majority of antibiotics tested were found to be between 39.3% and 99.1%. No isolate was observed to be resistant to colistin and polymyxin B. The rate of extensive drug-resistance among these clinical isolates was 62.5%. The prevalence of class 1 and 2 integrons was found to be 74.1% and 12.5%, respectively. Seven different gene cassettes (*ampC*, *aacA4-catB8*, ISAba1-bla_{OXA-23}-*GES-14*, *aadA2-cm1A6-GES-14-qacF*, *VIM-25-GES-24-qacF*, *dfrA5-ISAba1-*bla_{OXA-51}-bla_{OXA-40} and *aadA2-GES-11-IMP-1*) were observed in Class 1 integron-carrying strains. Three gene cassettes (*IMP-4*, *VIM-2-VEB-aacA4* and *dfrA2-sat-2-aadA4*) were detected in class 2 integron-bearing *A. baumannii* strains.

Conclusions: A high prevalence of integron was described among multidrug resistant *A. baumannii* in the hospital. The findings highlighted the need for continuous surveillance in order to prevent dissemination of multidrug resistance among *A. baumannii* strains in Iran.

1. Introduction

Acinetobacter baumannii (*A. baumannii*), as an important nosocomial pathogen especially in intensive care units (ICUs), is responsible for a wide range of infections that can be ranged from urinary tract infections to surgical wounds infection, ventilator-associated pneumonia, meningitis, bacteremia, and life threatening infections. The most important factor contributing to the successful extensive distribution of this nosocomial pathogen is stated to be its remarkable ability for the acquisition of a wide variety of antibiotic resistance genes and also adaptation in various harsh environments[1]. The acquisition of a wide variety of antibiotic resistance genes not only leads to an increase in economic burden, but also causes serious therapeutic problems. Moreover, it can lead to difficulties in infection control in hospitals and eradication of the bacteria. The emergence and extremely rapid spread of multidrug resistant *A. baumannii* isolates are becoming a serious concern in global public health. The spread of the resistant genes in hospitals and community is mediated by horizontal gene transfer[2]. Mobile elements including plasmids, transposons, or integrons are the most efficient genetic elements promoting acquisition and dissemination of resistance determinants[3]. During the past several decades, despite introduction of new therapeutic options, *A. baumannii* strains have shown a remarkable ability to rapidly develop multidrug resistance (MDR). This rapid increase of MDR is not only due to

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